BEACLS: Berkeley Efficient API in C++ for Level Set methods Installation Guide

Ken TANABE

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System requirements

- Required
  - OS
    - Mac OS X Sierra
    - Ubuntu Linux 16.04 LTS (x86_64)
    - Windows 7/8.1/10 (64bit)
  - Hardware
    - CPU: Intel Core Processor CPU
- Recommended
  - Hardware
    - CPU: 4th Generation Intel Core Processor CPU (Haswell arch.) or later
    - GPU: NVIDIA GeForce 900 Series GPU (Maxwell arch) or later
  - OS
    - Windows 10 Creators Update (version 1703, Redstone 2)
      - Required for Bash on Ubuntu on Windows

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Install to Mac OS X Sierra

1. Install Homeberw

   $ export PATH=/usr/local:$PATH
   $ sudo mkdir -p /usr/local
   $ ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)"

2. Install OpenMP, boost, OpenCV and hdf5

   $ brew update; brew upgrade
   $ brew install llvm boost hdf5
   $ brew install -with-ffmpeg -with-tbb opencv3
   $ brew link opencv3 --force

3. Download BEACLS

   $ mkdir ~/BEACLS; cd ~/BEACLS
   $ git clone https://github.com/HJReachability/beacls
   $ cd beacls

4. Build BEACLS

   $ cd beacls/sources
   $ make all

5. Test BEACLS

   $ cd samples/Plane_test
   $ make test

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Install to Ubuntu Linux 16.04 LTS (Without GPU)

1. Install zlib, boost, OpenCV and hdf5
   $ sudo apt-get update
   $ sudo apt-get upgrade
   $ sudo apt-get install zlib libhdf5-dev libboost-dev libopencv-dev
2. Download BEACLS
   $ mkdir ~/BEACLS; cd ~/BEACLS
   $ git clone https://github.com/HJReachability/beacls
   $ cd beacls
3. Build BEACLS
   $ cd beacls/sources
   $ make all
4. Test BEACLS
   $ cd samples/Plane_test
   $ make test

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Install to Ubuntu Linux 16.04 LTS (With GPU)

1. Install zlib, boost, OpenCV and hdf5
   $ sudo apt-get update
   $ sudo apt-get upgrade
   $ sudo apt-get install zlib libhdf5-dev libboost-dev libopencv-dev
2. Download and install CUDA 8.0
   https://developer.nvidia.com/cuda-downloads
3. Download BEACLS
   $ mkdir ~/BEACLS; cd ~/BEACLS
   $ git clone https://github.com/HJReachability/beacls
   $ cd beacls
4. Build BEACLS
   $ cd beacls/sources
   $ make WITH_GPU=Y NVCC=/usr/local/cuda-8.0/bin/nvcc all
5. Test BEACLS
   $ cd samples/Plane_test
   $ make test

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Install to Windows 7/8.1/10 (Without GPU)

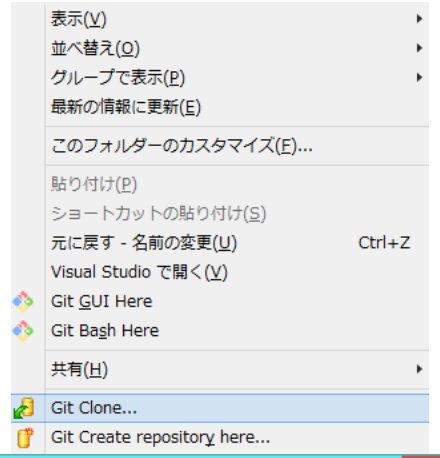
1. Download and install HDF5 Pre-built Binary Distributions
   1. Download binary distribution from HDF group site
      - https://www.hdfgroup.org/HDF5/release/obtain5.html
      - 1.8.18-win64-vs2015: http://www.hdfgroup.org/ftp/HDF5/current/bin/windows/extra/hdf5-1.8.18-win64-vs2015-shared.zip
   2. Extract a zip file and install it.
2. Download and install Boost
   1. Download binary distribution from the site: http://www.boost.org/users/download/
      - 1.63.0: https://sourceforge.net/projects/boost/files/boost/1.63.0/boost_1_63_0.zip/download
   2. Extract a zip file to c:¥Boost¥Boost_1_63_0
3. Download and install OpenCV
   1. Download binary distribution from the site: http://opencv.org/
      - 3.2.0: https://sourceforge.net/projects/opencvlibrary/files/opencv-win/3.2.0/opencv-3.2.0-vc14.exe/download
   2. Execute installer and extract files to c:¥OpenCV3¥opencv3.2.0

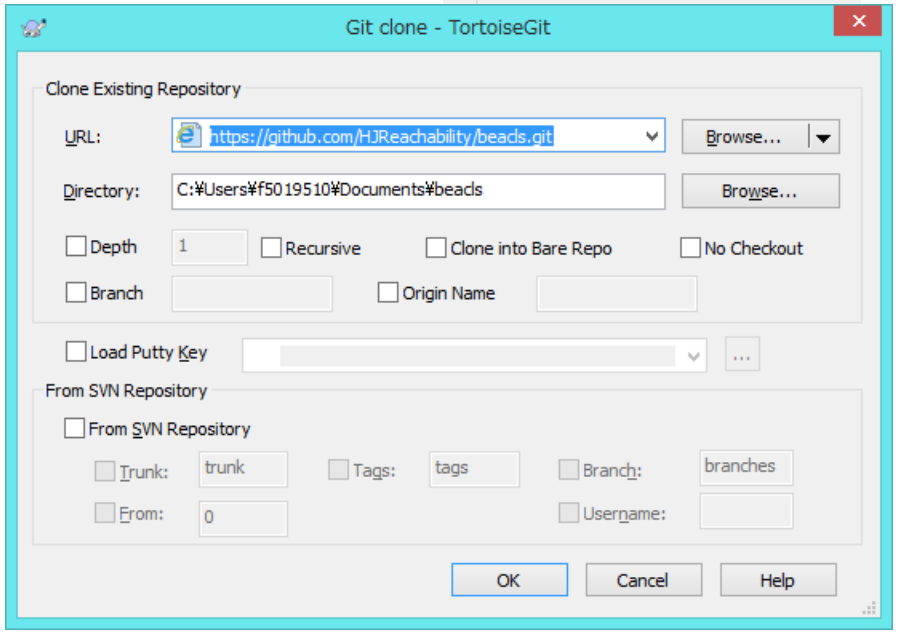
Install to Windows 7/8.1/10 (Without GPU) (cont'd.)

4. Download and install git for Windows
   1. Download binary distribution from the site : https://git-for-windows.github.io/
      - 2.12.0-64bit: https://github.com/git-for-windows/git/releases/download/v2.12.0.windows.1/Git-2.12.0-64-bit.exe
   2. Execute installer
5. Download and install tortoisegit
   1. Download Boost from Boost site: https://tortoisegit.org/
      - 2.4.0.2-64bit: https://download.tortoisegit.org/tgit/2.4.0.0/TortoiseGit-2.4.0.2-64bit.msi
   2. Execute installer
6. Download and install Visual Studio 2015
   https://www.visualstudio.com/vs/older-downloads/

Install to Windows 7/8.1/10 (Without GPU) (cont'd.)

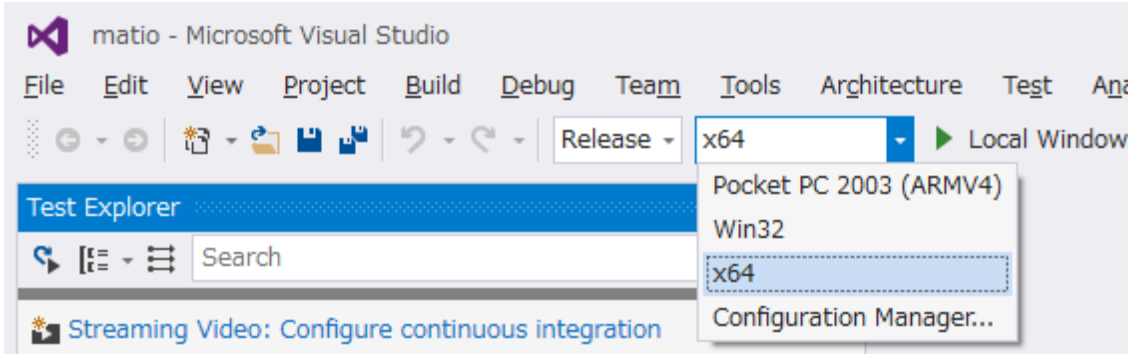
7. Download BEACLS
    1. Open Documents folder by explorer
    2. Choose “Git clone…” from cotext memu.
    3. Set repository information and push OK
       URL: https://github.com/HJReachability/beacls
    4. Open beacls folder





Install to Windows 7/8.1/10 (Without GPU) (cont'd.)

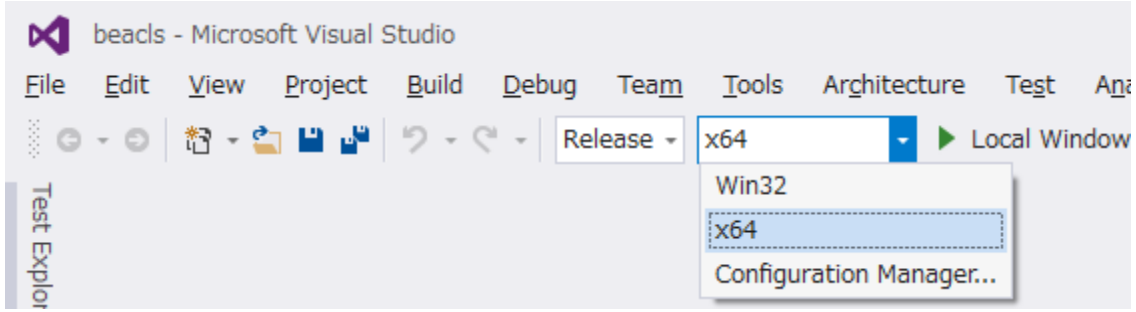
8. Build matio (Matlab file I/O library)
    1. Run Visual Studio solution from the batch file
        - sources¥run_visualstudio14_matio.bat
            - It sets environmental variables for some libraries paths.
    2. Choose “Release” as Solution Configuration and “x64” as Solution Platform



    3. Build matio by pushing “F7” key.

Install to Windows 7/8.1/10 (Without GPU) (cont'd.)

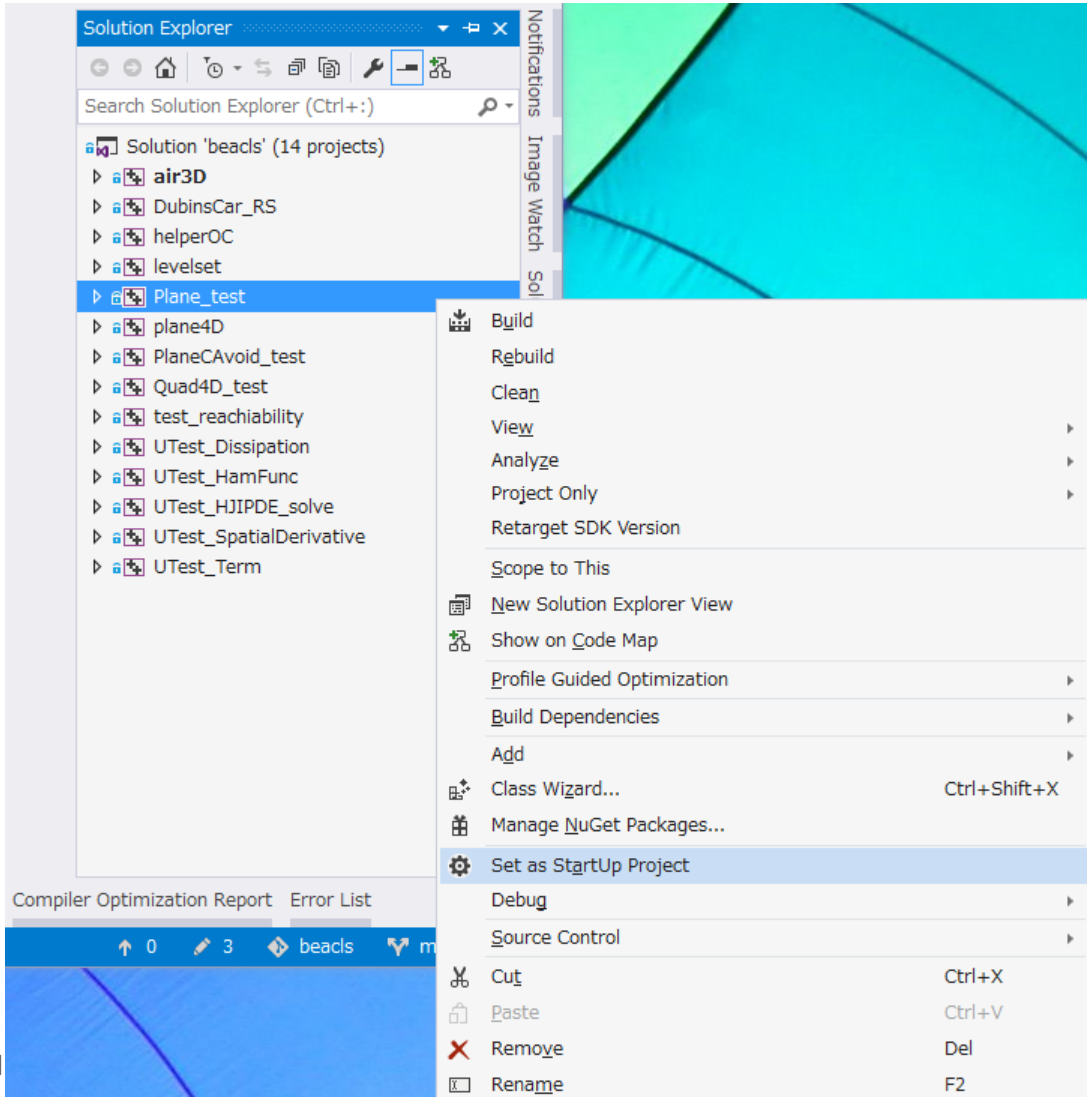
9. Build BEACLS
    1. Run Visual Studio solution from the batch file
        - sources¥run_visualstudio14_beacls.bat
            - It sets environmental variables for some libraries paths.
    2. Choose “Release” as Solution Configuration and “x64” as Solution Platform



    3. Build all projects of beacls solution by pushing “F7” key.

Install to Windows 7/8.1/10 (Without GPU) (cont'd.)

10. Execute Plane_test
    1. Click “Set as StartUp Project” from a context menu of Plane_test in Solution Explorer
    2. Execute Plane_test by pushing “F5” key.



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Install to Windows 7/8.1/10 (With GPU)

Install from step 1 to step 8 of Windows 7/8.1/10 (without GPU)

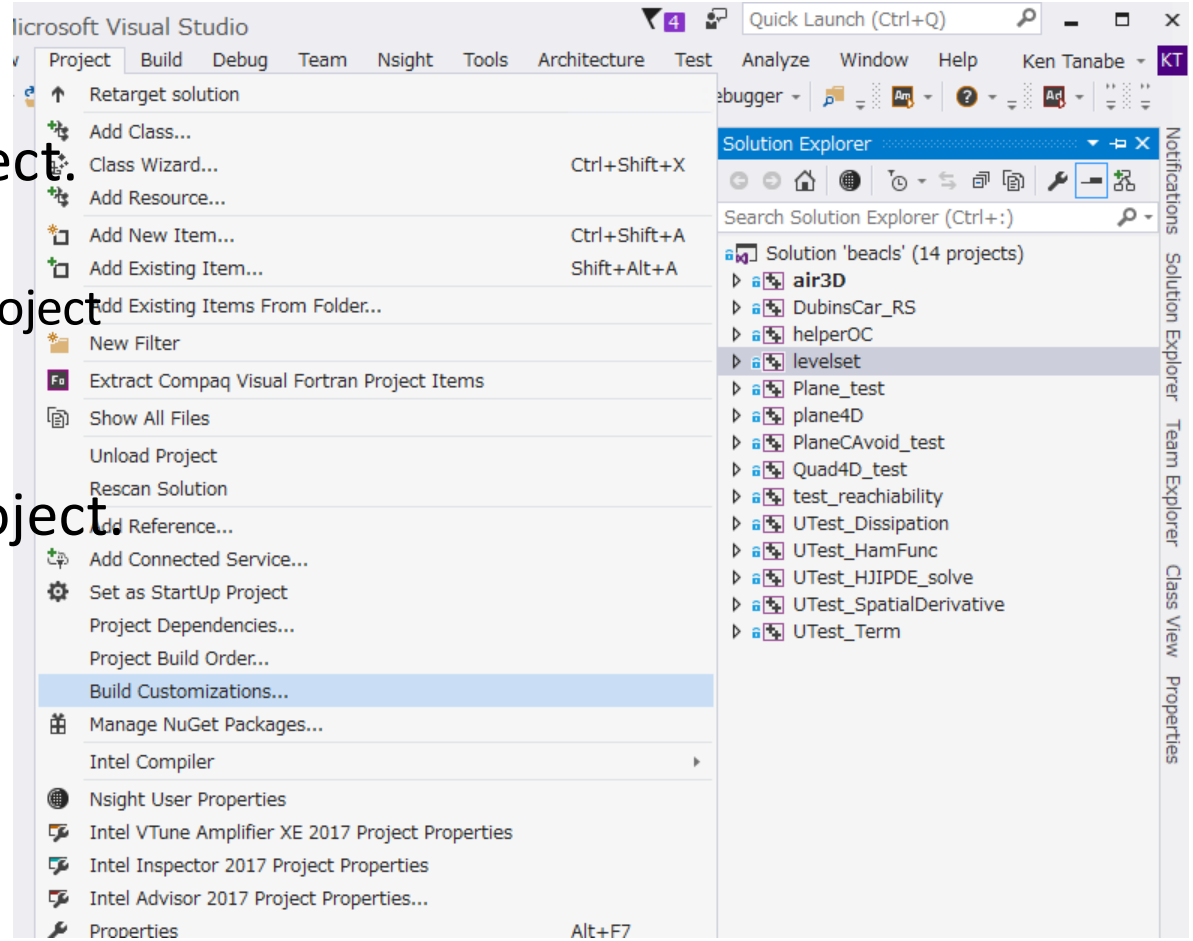
9. Download and install CUDA 8.0
   https://developer.nvidia.com/cuda-downloads

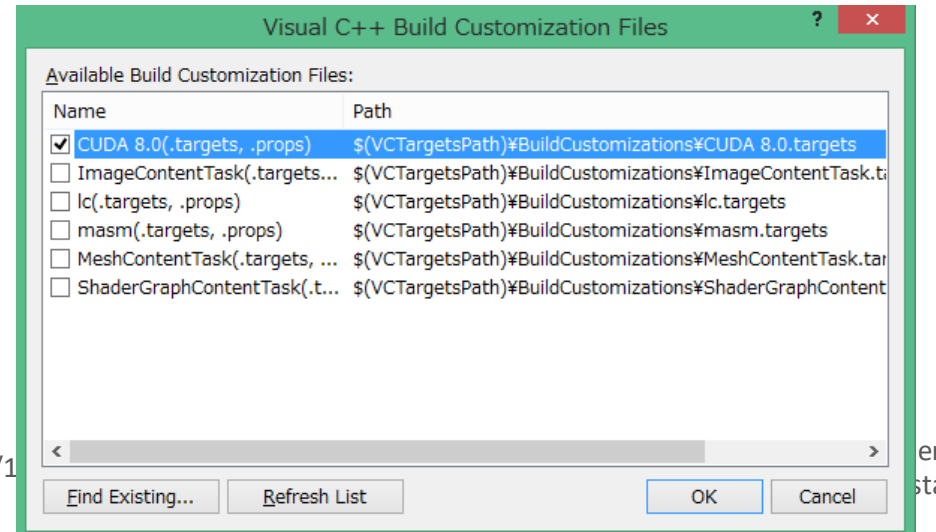
Install to Windows 7/8.1/10 (With GPU) (cont'd.)

10. Build BEACLS
    1. Run Visual Studio solution from the batch file
        - sources¥run_visualstudio14_beacls_cuda.bat
            - It sets environmental variables for some libraries paths.
    2. Run Visual Studio solution from the batch file

Install to Windows 7/8.1/10 (With GPU) (cont'd.)

10. Build BEACLS (Cont'd)
    3. Enable CUDA build for levelset project.
        1. Choose "levelset" in Solution Explorer
        2. click "Buillld Customizations…" from Project tab of tool bar.
        3. Enable "CUDA 8.0(.targets, .props)"
    4. Enable CUDA build for helperOC project.

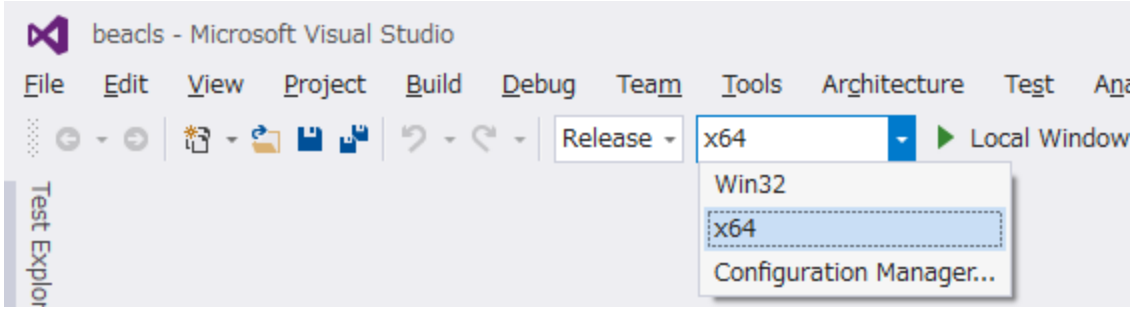




Install to Windows 7/8.1/10 (With GPU) (cont'd.)

10. Build BEACLS

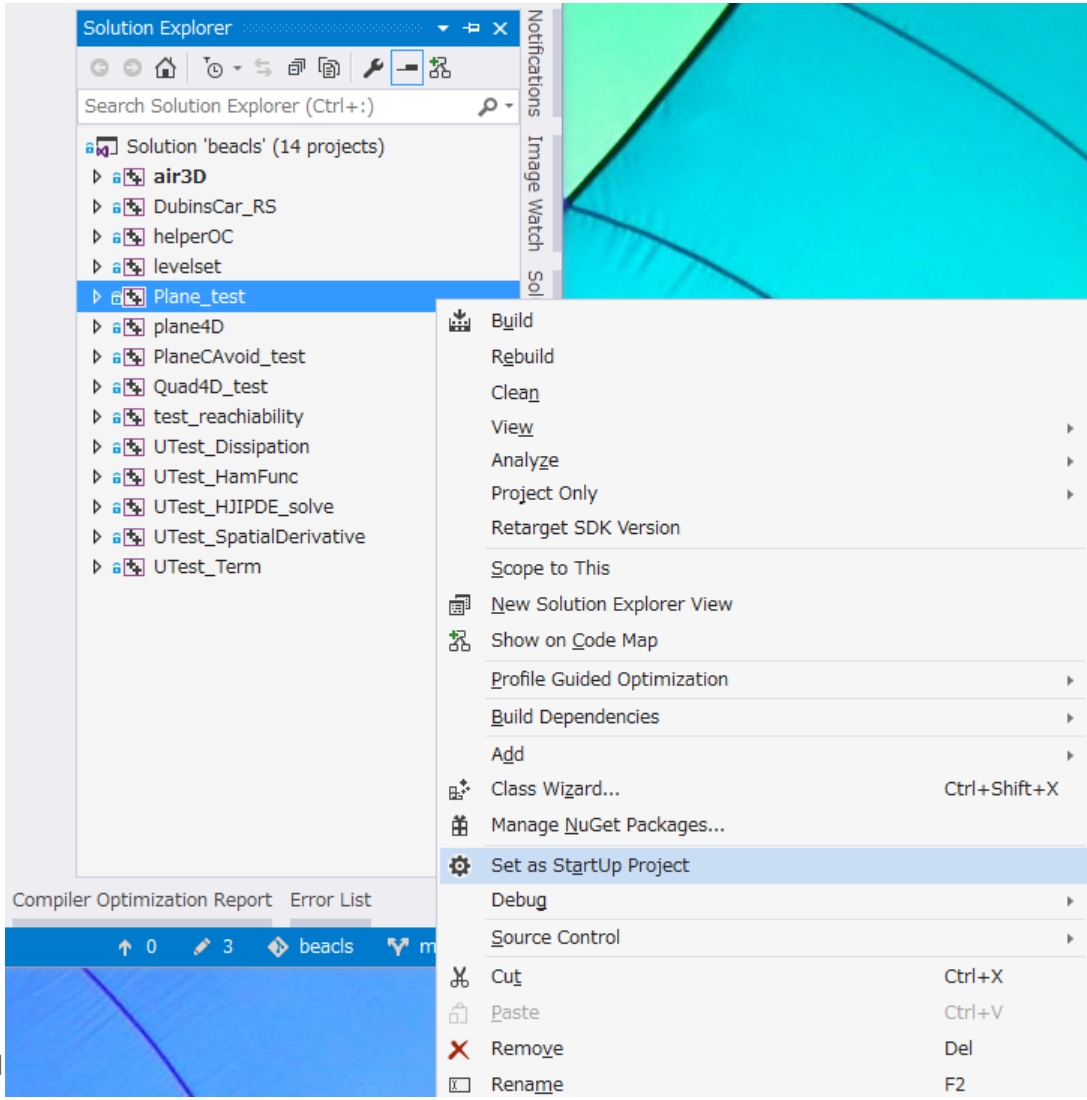
5. Choose “Release” as Solution Configuration and “x64” as Solution Platform



6. Build all projects of beacls solution by pushing “F7” key.

Install to Windows 7/8.1/10 (With GPU) (cont'd.)

11. Execute Plane_test
    1. Click “Set as StartUp Project” from a context menu of Plane_test in Solution Explorer
    2. Execute Plane_test by pushing “F5” key.



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Install to Bash on Ubuntu on Windows (Without GPU)

1. Update Windows 10 to Windows 10 Creators Update (version 1703, Redstone 2)
2. Install X Window System Server for Windows
   Cf) Xming : http://www.straightrunning.com/XmingNotes/
3. Run X Windows System Server
4. Install Bash on Ubuntu on Windows
   https://msdn.microsoft.com/en-us/commandline/wsl/install_guide
5. Run bash
6. Set DISPLAY environment variable
   $ export DISPLAY=0:0

Install to Bash on Ubuntu on Windows (Without GPU) (cont'd)

7. Install boost, OpenCV and hdf5
   $ sudo apt-get update
   $ sudo apt-get upgrade
   $ sudo apt-get install libhdf5-dev libboost-dev libopencv-dev
8. Download BEACLS
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Thank you!